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ABSTRACT

A study of possible modifications to the Chapter 1 formula examined whether such change might better target the federal funds to the needs of low-achieving students in high poverty areas. The study used data from a national evaluation of Chapter 1. The data underwent a multiple regression analysis focusing on the relationship between low achievement and the number of poor students. An illustrative funding formula was developed to demonstrate how recognizing the greater need in counties with high numbers of poor children and providing extra funds to low-income counties would have changed Chapter 1 allocation in fiscal year 1990. Results suggest that changing the formula could increase the program funds to counties with greater needs. The current formula does not reflect the distribution of poverty-related low achievers, provide extra assistance to areas unable to fund remedial services, or reflect differences in local costs. A revised formula would improve targeting if it relied on a more precise method of estimating poverty-related low achievers, used an income adjustment factor, and used a uniform measure of education services costs. Included are two tables, and four appendixes containing additional data in four tables and one figure, information on methodology, comments from the U.S. Department of Education, and a list of major contributors. (JB)

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United States General Accounting Office

GAO

Report to Congressional Requesters

July 1992

REMEDIAL EDUCATION

Modifying Chapter 1 Formula Would Target More Funds to Those Most in Need

ED350366

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United States
General Accounting Office
Washington, D.C. 20548

Human Resources Division

B-243678

July 28, 1992

The Honorable William D. Ford
Chairman, Committee on Education and Labor
House of Representatives

The Honorable William F. Goodling
Ranking Minority Member
Committee on Education and Labor
House of Representatives

The Honorable Steve Gunderson
The Honorable Thomas E. Petri
The Honorable Carl C. Perkins
The Honorable Robert E. Wise, Jr.
The Honorable Fred Grandy
House of Representatives

The Honorable James M. Jeffords
United States Senate

The chance of children succeeding in school is diminished if they come from poor families or live in poor neighborhoods. The 1980 decennial census indicated that one in six children come from families with incomes below the federal poverty level. To compensate for the adverse effects of poverty on student achievement, the Congress established the Chapter 1 program to fund supplementary remedial education services for low achievers in poverty areas.

The Department of Education uses a legislatively set formula to determine the allocation of Chapter 1 funds to school districts. The Chapter 1 funding formula for allocation to school districts has two grant components—basic and concentration. School districts combine funds from both types of grants to finance remedial education at qualifying schools they select.

At your request, we agreed to determine whether modifications to the Chapter 1 funding formula would improve the targeting of program funds. Specifically, we focused on whether

- a revised funding formula would better meet the needs of low-achieving children in high poverty areas and jurisdictions less capable of financing remedial education services,

- the Chapter 1 formula adequately reflects the cost of providing education services, and
- information more current than census data is available for determining the distribution of Chapter 1 funds.

Results in Brief

Changing the Chapter 1 formula could increase program funds to counties with greater needs. Three circumstances impair the formula's ability to target program funds to such counties. The legislatively mandated formula does not

- accurately reflect the distribution of poverty-related low achievers,
- provide extra assistance to areas with relatively less ability to fund remedial education services, and
- adequately reflect differences in local costs of providing education services.

A revised funding formula would improve the targeting of Chapter 1 funds if it (1) relied on a more precise method of estimating the number of poverty-related low achievers, (2) used an income adjustment factor to grant additional assistance to areas least capable of financing remedial instruction, and (3) employed a uniform measure of education services costs that recognized differences within and between states.

Background

The Chapter 1 program, authorized by Chapter 1 of Title I of the Elementary and Secondary Education Act of 1965, as amended, provides the largest share of federal assistance to elementary and secondary school students. In fiscal year 1990, states received almost $5 billion in Chapter 1 grant funds to serve more than 5 million children in prekindergarten through grade 12. These funds are used primarily to hire remedial education instructors.

The law authorizes Education to allocate Chapter 1 basic and concentration grant funds to states based on the number of impoverished children residing in their counties. States, in turn, distribute program funds to school districts in these counties, which use the funds to finance remedial education at schools they select. In making annual allocations, the law guarantees counties at least 85 percent of their preceding year's allocations. Education allocates basic grants ($4.4 billion or 92 percent of fiscal year 1990 Chapter 1 grant funds) using (1) the number of children from families with incomes below the poverty level and (2) a per-pupil

adjustment—termed the cost factor—linked to the state's average per-pupil expenditure to reflect state differences in education costs.[1] Education allocates concentration grants ($395 million in fiscal year 1990) based on the number of counties where children in poverty make up over 15 percent or 6,500 of their school-aged children.[2]

Local Level Influences

The law allows school districts broad discretionary powers in determining how resources are distributed to schools, specifying the grades served and the type and intensity of services, and defining which students are low achievers. These factors result in considerable variation among students who receive Chapter 1 services. For example, in some school districts Chapter 1 funds serve only children scoring below the 20th percentile on standardized tests. In other districts, program funds serve some children scoring above the national average (the 50th percentile) if they meet other district criteria, such as teacher recommendations, past program participation, or classroom grades. Researchers for the National Assessment of Chapter 1, a congressionally mandated study, reported that over 11 percent of program recipients were not poor and achieved above the 50th percentile.[3]

Methodology

To develop a modified measure of need for Chapter 1 services, we estimated the number of children whose low achievement is related to poverty. We based our analysis on data from the Study of the Sustaining Effects of Compensatory Education on Basic Skills, a national evaluation of Chapter 1 conducted from 1975 to 1983. Our data base included, among other variables, information on students' academic achievement and socioeconomic status collected from 321 schools.[4] These schools served about 110,000 students in grades 2 through 6.[5] These data were the most

[1]The "cost factor" is not a direct measure of costs, but a proxy measure based on 40 percent of the average state per-pupil spending for education. The cost factor used cannot be less than 80 percent nor more than 120 percent of the national average per-pupil expenditure.

[2]In appendix I, we compare the distribution of fiscal year 1990 concentration grant funds to high-need and rural counties with the distribution expected under a formula comprised of the basic grant formula component alone.

[3]Poverty, Achievement and the Distribution of Compensatory Education Services, National Assessment of Chapter 1. Office of Education Research and Improvement, Department of Education (Washington, D.C., 1986).

[4]We used school data because county-level data on low achievers were not available.

[5]We excluded students in the first grade because of the unreliability of their test scores. (See Kennedy, Jung, and Orland, Poverty, Achievement, and the Distribution of Compensatory Education Services, Office of Educational Research and Improvement, Department of Education, Washington, D.C.: GPO, 1986, p. F-9.)

current available that contained measures of poverty and low achievement at the time of our analysis.

We used multiple regression analysis, a standard statistical method, to estimate the number of children whose low achievement is attributable to poverty at the school level.[6] Our statistical analysis focused on the relationship between low achievement and the number of poor students (see app. II).[7] We then used this information in conjunction with 1980 decennial census data on county poverty to develop estimates of children needing Chapter 1 services.

We classified the nation's counties according to their portion of children-in-need, and analyzed fiscal year 1990 Chapter 1 allocations by relative portions of children-in-need and residents living in urban areas. Counties with percentages of children-in-need above the national average of 13.7 percent we labeled "high need"; those at or below the national average we labeled "low need." Based on the percentage of the county's urban population, we labeled each third with the highest and lowest degree of urbanization "urban" and "rural," respectively.[8] We labeled the middle third "mixed."

Illustrative Funding Formula

We developed an illustrative funding formula to demonstrate how recognizing the greater need in counties with high numbers of poor children and providing extra funds to low-income counties would have changed Chapter 1 allocations in fiscal year 1990. In devising our illustrative formula, we

- modified the Chapter 1 formula to better reflect the number of poverty-related low achievers in counties with large numbers of poor children, and
- incorporated an income adjustment factor to provide extra funds to counties with relatively less ability to pay for supplementary education services.

[6]We call these children whose low achievement is related to poverty "children-in-need." Our estimate of the number of children in need of remedial instruction includes both poor and nonpoor low achievers whose number increases with the number of poor children in the school.

[7]For our purposes, we defined low achievers as children who scored below the 25th percentile, or in the bottom quarter, on standardized tests.

[8]We used the Bureau of the Census definition of the urban population, namely, all persons living in places of 2,500 or more inhabitants or in an urbanized area—including a population concentration of at least 50,000 inhabitants, generally consisting of a central city and surrounding, closely settled, contiguous territory (suburbs).

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We incorporated the cost measure used in the current formula to adjust for differences in state education costs. We did not attempt to make further adjustments.

See appendix II for a more detailed discussion of the Chapter 1 funding formula and our illustrative formula and the methodology used.

Modification of the Chapter 1 Formula Would Improve the Distribution of Program Funds

Children-in-Need Understated for Some Areas

The measure of need for Chapter 1 services used in the current funding formula results in an underestimation of children-in-need of services in areas with large numbers of poor children. The Chapter 1 formula uses the number of poor children as a proxy for the number of children-in-need. In most cases, this is a good approximation because children-in-need generally increase proportionally with the number of poor children. However, we found that schools with high numbers of poor children—typically in poor urban counties—have disproportionately more low achievers than schools with fewer children in poverty. As such, the measure of need for services used in the current formula is inappropriate for schools in this category. To illustrate this condition, we ranked our school sample in descending order according to poverty rates. Among the top third, schools with 50 or fewer poor children had, on average, about 2.9 low achievers for every 10 poor children. In contrast, schools with 126 or more poor children had, on average, about 4.9 low achievers for every 10 poor children.

High Poverty Counties Underfunded

For counties with relatively high numbers of poor children, such as high-need urban counties, the Chapter 1 formula overestimates the amount of funding currently allocated per child-in-need. The Chapter 1 estimate of children needing remedial services—children in poverty—indicates that all high-need counties receive approximately the same allocations when using numbers of children in poverty to allocate funds.

However, when we revised the estimate to take into account the disproportionately greater numbers of children-in-need in counties with large numbers of poor children, we found that urban high-need counties generally received less funding per low-achieving child than rural and mixed high-need counties.

As shown in table 1, under the current formula's estimate of children needing services, high-need urban counties had about 2.2 million such children and received $646 per child from Chapter 1 grants for fiscal year 1990. We adjusted the formula's estimate of children-in-need to reflect the disproportionate number of low achievers residing in counties with high numbers of poor children. Under this revised estimate, high-need urban counties had about 2.7 million children-in-need and received $526 per child from Chapter 1 grants. The revised estimate also indicated that high-need rural counties had about 1.3 million children-in-need and received $789 per child-in-need—50 percent more than their urban counterparts.

Table 1: Effect of Different Estimates of Children-in-Need on Chapter 1 Allocations (Fiscal Year 1990)

	Estimated number of children-in-need (in thousands)		Estimated funds per child-in-need	
County group	Chapter 1 estimate	Revised estimate	Chapter 1 estimate	Revised estimate
Urban				
High need	2,210	2,711	$646	$526
Low need	439	412	614	654
Mixed				
High need	967	925	647	677
Low need	1,068	925	595	687
Rural				
High need	1,607	1,318	647	789
Low need	1,087	888	589	721

Notes: We label those counties whose percentage of children-in-need is above the national average "high-need"; those with percentages of such children at or below the national average we label "low-need" counties.

Based on the percentage of the county's urban population, we labeled each third with the highest and lowest degree of urbanization "urban" and "rural," respectively. We labeled the middle third "mixed."

Counties' Ability to Pay Not Considered

The Chapter 1 funding formula does not account for variations in county or state fiscal capacities. A county's fiscal capacity or tax base generally

reflects its ability to finance public goods, such as education programs. Among counties eligible for Chapter 1 funding, those with low tax bases must levy higher taxes than those with high tax bases to finance a comparable level of supplementary education services. This condition may acutely affect highly impoverished urban and rural counties that have the fewest resources to provide educational services.

Cost Factor Inadequate

Several problems exist with the Chapter 1 formula's cost factor. Using education spending as a measure of cost causes one problem. A state's average per-pupil expenditure—the current measure of educational costs—may be higher than others because it (1) has a greater fiscal capacity, (2) chooses to procure more expensive educational instruction, or (3) gives education a relatively higher funding priority. The formula does not differentiate between the reasons for differences in average state spending; instead it allocates fewer funds to those states that either cannot or do not spend as much on education. For example, Wyoming receives about 19.5 percent more in Chapter 1 basic grant aid per eligible pupil than Montana because its cost factor is that much greater. Despite generally similar state tax burdens, Wyoming is able to spend more on education than Montana because of greater per capita incomes.[9]

A failure to adjust for differences in education costs within states causes another problem. Given equal Chapter 1 allocations, low-cost school districts can purchase more education services than high-cost districts. Consequently, school districts located in high-cost areas—such as large urban or very small rural districts—may have to exclude some eligible children or provide less intensive remedial instructional services because services cost more than in other areas of the country.

Finally, state per-pupil expenditures are not defined uniformly. Because federal Chapter 1 requirements direct states to define the average daily attendance of pupils according to state law in computing average per-pupil expenditures, the definition of per-pupil expenditures varies among states. For example, one state includes excused absences in computing the number of pupils in attendance while others do not. With fewer pupils counted, per-pupil expenditures are higher than otherwise, which in turn, results in more Chapter 1 funding.

[9]According to an interstate cost-of-living index developed by the American Federation of Teachers, the cost-of-living in these two states is very similar. Montana's cost-of-living is estimated as 91.3 percent of the national average; Wyoming's is 91.7 percent.

Revising the Chapter 1 Formula Could Target Money to Counties With Greater Needs

A funding formula similar to our illustrative formula, if used in fiscal year 1990, would have increased Chapter 1 allocations to high-need counties and those with less ability to pay at the expense of those with relatively less need. As shown in table 2, Chapter 1 allocations to high-need urban counties would have increased, on average, from $526 to $707 per child. Allocations for high-need rural counties would have increased, on average, $78 per child over the same period (from $789 to $867), because rural counties are among those least likely to have resources for remedial education services. This redistribution is made possible by reducing allocations to counties with higher incomes and lower numbers of poor children. If we had retained the law's guarantee of 85 percent of the previous year's allocation, funding levels would change more gradually.

Table 2: Average Chapter 1 Allocations Per Child-in-Need Using the Chapter 1 Formula and Our Illustrative Formula
(Fiscal Year 1990)

County group	Our estimate using Chapter 1 formula	Our estimate using illustrative formula
Urban		
High need	$526	$707
Low need	654	289
Mixed		
High need	677	660
Low need	687	301
Rural		
High need	789	867
Low need	721	364

Notes: We label those counties whose percentage of children-in-need is above the national average "high-need"; those with percentages of such children at or below the national average we label "low-need" counties.

Based on the percentage of the county's urban population, we labeled each third with the highest and lowest degree of urbanization "urban" and "rural," respectively. We labeled the middle third "mixed."

We also determined how Chapter 1 allocations would have changed if the funding formula targeted additional funds to counties with relatively less ability to pay for education services. Under our illustrative formula, Chapter 1 allocations to high-need, low-income counties would have increased, on average, from $653 to $958 per child-in-need. As a result, the illustrative formula reduced allocations to counties with less need or higher abilities to pay. For example, Chapter 1 allocations to low-need, high-income counties would have decreased, on average, from $686 to $294 per child-in-need.

If high-need, low-income counties had received these additional funds and used them to provide services to more children rather than provide more intensive services, Chapter 1 funds would have reached almost 500,000 additional children in these counties. If instead districts used funds to serve the same number of children more intensively, per-pupil funding would increase approximately 50 percent.[10]

Our illustrative formula used the same factor as the current Chapter 1 formula to measure education service costs. To the extent that educational service costs are higher in high-income rather than in low-income counties, an improved cost factor could have lessened the amount of funds reallocated to low-income counties.

Food and Nutrition Service Data Shows Promise for Use in Updating Census Data Estimates

Most of the poverty data used to determine Chapter 1 allocations comes from the decennial census. Currently, children aged 5 to 17 in families with incomes below the poverty level, as obtained from the 1980 decennial Census of Population and Housing, make up 95 percent of the 8.1 million children used to allocate basic grants. These data are not updated annually. The remaining 5 percent are comprised of (1) children in families receiving Aid to Families With Dependent Children payments greater than the poverty level for a family of four and (2) neglected, delinquent, and foster children residing in school districts. In contrast to census data, these data are updated annually.

To participate in the Department of Agriculture's school lunch program, states are required to collect data annually at the school district level on the number of children who apply and are certified as eligible for free or reduced price lunches.[11] Although we did not conduct a detailed review, we believe that these data could be used to update estimates of children-in-need for the purpose of allocating Chapter 1 funds. For example, when the number of children eligible for free lunches increases by 10 percent from the previous year, a similar adjustment could be made to the children-in-poverty estimates originally derived from the census. The use of these data is not without problems. For example, secondary school students from low-income families are less likely to be counted than elementary school students because they are less likely to participate

[10]This information is for illustrative purposes. We would expect that choices about how to best utilize additional Chapter 1 funds would vary among school districts.

[11]Children whose family income is within 130 percent of the poverty level are eligible for free lunches, while children whose family income is between 130 and 185 percent of the poverty level are eligible for a reduced price lunch.

in the food subsidy program. However, the behavior of individuals is not expected to change substantially from year to year. Therefore, lower overall participation rates would not be expected to affect changes in poverty rates from year to year.

Analysis Limitations

Our illustrative funding formula is intended as an example. While it more adequately adjusts for counties' ability to provide educational services and more accurately estimates the number of children-in-need, two conditions preclude its candidacy as a permanent replacement formula. First, the scope of its corrective measures is not all inclusive. A new Chapter 1 funding formula should include an improved cost factor rather than the current cost factor used in our formula. Second, the choice of an income adjustment factor is inherently a policy decision. Other income measures, besides the one we used, can be developed that would meet specific redistributive policy preferences.

Also, since our illustrative formula introduced an adjustment for county income, but relied upon the state-level measure of education costs used in the Chapter 1 formula, the results it generated should be viewed with caution. Both formulas implicitly assume that the cost of providing educational services is the same for all counties within a given state. However, if costs are higher in high-income counties than in low-income counties, our illustrative formula overstates the fiscal capacity of high-income counties and understates the fiscal capacity of low-income counties—causing a greater redistribution of resources from high-income to low-income counties than intended. The extent of this greater redistribution cannot be known until a county-level cost index is developed.[12]

Conclusions

Modifications to the Chapter 1 allocation method could target more funds to counties with the largest numbers of poverty-related low achievers and those least able to finance remedial instruction. In addition, a consistently defined and better measure of education costs would improve the distribution of Chapter 1 funds.

Revising the formula—in a manner consistent with our suggestions—would increase the likelihood that more children-in-need will benefit from Chapter 1 funds. However, given the flexible

[12]However, other factors could offset this effect (see app. II).

implementation guidelines, local-level administrators also affect which children receive Chapter 1 funded services.

Recommendations to the Congress

We recommend that the Congress revise the Chapter 1 formula to reflect the greater need of counties with high numbers of poor children and grant additional assistance to those counties with relatively less ability to fund remedial education. We further recommend that the Congress, in conjunction with the Secretary of Education, develop a cost factor that better reflects educational cost differences among states and school districts.

Agency Comments and Our Evaluation

The Department of Education provided written comments on a draft of this report (see app. III). Education generally agreed with our conclusion that the Chapter 1 formula warrants improvement, while suggesting a number of technical changes and expressing some reservations. In response to the technical suggestions, we considered the information and revised the report where appropriate, including revising our methodology section to clarify our presentation of technical details. Among other things, this included (1) providing additional information on the sources of data used to estimate numbers of low achievers at the school and county levels and (2) expanding the description of our statistical modeling.

Education expressed concern about the possibility of using data on children eligible for free school lunches to update decennial census data for allocating Chapter 1 funds. We recognize that school lunch data are an imperfect source of data on impoverished children. As such, we did not recommend using these data as a base. We did, however, suggest using them to obtain information on the rate of change in poverty, thereby making a commensurate revision to census data on the numbers of impoverished children.

Education also expressed concern about our example of the number of additional children that could be served if counties with high-need and low incomes used additional dollars—expected to result from an improved funding formula—to serve more students rather than provide more intensive services. We recognize that districts may use the additional funds to serve students more intensively. To clarify this point, we added an example that shows the additional funds that would be available per child served if these counties decided to intensify services to these children. We

also noted that choices about how to best utilize additional Chapter 1 funds would vary among school districts.

Education was also concerned that "the use of GAO's statistical models could open the Federal Government to complaints of statistical manipulation." We believe that the statistical models we presented provide more precision in targeting Chapter 1 services. The formula alternatives we presented use the same statistical data as the formulas used in current law. Therefore, they are not subject to any more manipulation than the existing formulas. Moreover, other federal funding formulas are based on statistical models, such as regression analysis, including the low-income home energy assistance block grant and Medicare's payments to teaching hospitals.

We share Education's concern with the age of the data used in our analysis. We also noted that while these data are not recent, they were the only national data available that provided information on poverty and low achievement in schools at the time of our analysis. We do not expect that the relationship between poverty and low achievement has changed dramatically. National Assessment of Educational Progress data collected in 1990 also suggest that rates of low achievement are highest in disadvantaged urban areas—those areas with high numbers of children in poverty that we estimate to have disproportionately high rates of low achievement.

We are sending copies of this report to the Secretary of Education, appropriate congressional committees, and other interested parties. If you wish to discuss the contents of this report please contact Linda G. Morra, Director, Education and Employment Issues, at (202) 512-7014. Other major contributors are listed in appendix IV.

Lawrence H. Thompson

Lawrence H. Thompson
Assistant Comptroller General

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Abbreviations

BEA	Bureau of Economic Analysis
SAPPE	state average per-pupil expenditure

Chapter 1 Allocations With and Without Concentration Grants

We were asked to examine the effect of the Chapter 1 formula's concentration grant component on Chapter 1 allocations to high-need counties and rural counties. We assessed how the 1990 fiscal year concentration grant funds ($395 million) would have been allocated based solely on the basic grant formula. Under the basic grant formula, on average,

- the high-need counties would have received less Chapter 1 funding ($51 versus $69 per child-in-need) and
- the rural counties would have received more Chapter 1 funding ($64 versus $59 per child-in-need).

Methodology

Data Sources

Our analysis focused on the relationship between a school's number of poverty-related low achievers and its enrollment of impoverished children. To conduct our analysis, we used data from the Study of Sustaining Effects of Compensatory Education on Basic Skills, a national evaluation of Chapter 1. The Sustaining Effects Study's researchers collected data on students in grades 1 through 6 from school years 1976-77 through 1978-79.[1] The study used a modified version of the Comprehensive Test of Basic Skills to measure students' educational achievement in the fall and spring for each of the 3 years.

The Sustaining Effects Study's initial sample included 328 schools containing grades 1 through 6; aggregate school data on numbers of low achievers and impoverished children were available for 321 of these schools. Of the 328 sample schools,

- 242 were selected using a random sample stratified according to geographical location, school district size, and poverty rate;
- 43 were selected because program experts thought the schools were highly effective for low-achieving students;
- 29 were selected because they had high-poverty rates despite not having remedial education programs; and
- 14 were included because they fed into one of the 242 schools that did not contain all grades 1 through 6.

Our sample consisted of 321 schools with about 110,000 students in grades 2 through 6. The sample size would have decreased from 321 to 242 schools (110,000 to 15,579 students) if we had used the census' poverty measure to determine school-aged children in poverty. Instead, we used the eligibility of students for free or reduced price lunches as a poverty indicator. We excluded students in the first grade because of the unreliability of their test scores.

We used achievement scores from the fall of the study's first year, which had the largest sample size. For the first year, the study assessed student achievement for reading, mathematics, and basic skills using two levels of standardized tests. These levels of standardized tests are "at-level" (grade-appropriate level) and "below-level" (just below the grade-appropriate level). We defined low achievers as those scoring below

[1]These data were the most current available when we conducted our review.

the 25th percentile on a test of basic skills, using the test score derived from the "below level" test.[2]

Degree of Urbanization and Income Per Child-in-Need

To examine Chapter 1 1990 fiscal year allocations on the basis of the counties' degree of urbanization, we used 1980 decennial census data.[3] We divided the nation's counties into three groups based on the county's urban population, each containing a third of the nation's population. Counties with 95 percent or more of their populations living in urban areas we called "urban." Counties with less than 67 percent and those with between 67 and 94 percent of their populations living in urban areas we called "rural" and "mixed," respectively.

In examining Chapter 1 allocations on the basis of income per child-in-need, we used income data collected by the Bureau of Economic Analysis (BEA). First, we divided the counties' total resident personal income by our estimate of children-in-need. (This estimate is shown in table 1.) We then ranked the nation's counties and separated them into three groups, each having one-third of the total number of children-in-need. Counties with the highest, lowest, and middle income per child-in-need we called "high income," "low income," and "moderate income," respectively. To moderate the effect of a possible atypical year, we used a 3-year average of county income for most recent years available—1986 through 1988.

Exclusions

Our analysis of allocations per child-in-need for the nation's counties excluded seven states that receive a portion of the state minimum concentration grant funds. Because the law does not specify how these states should allocate these additional funds, we were unable to estimate their county allocations. Since Chapter 1 allocations to these states totaled less than 2 percent of total program dollars, we believe that their exclusion had a minimal effect.

We also omitted Puerto Rico from our analysis of county groups because BEA did not generate comparable income data for territories. However, we did approximate Puerto Rico's income per child-in-need and included it in

[2]The below-level achievement test has been found to be an appropriate measure of student achievement for schools with high portions of low-achieving children. See Judith Hemenway and others, The Measures and Variables in the Sustaining Effects Study (Santa Monica, CA: Systems Development Corporation, 1978).

[3]Data on counties' number of children in poverty for 1990 were not available when we conducted our analysis.

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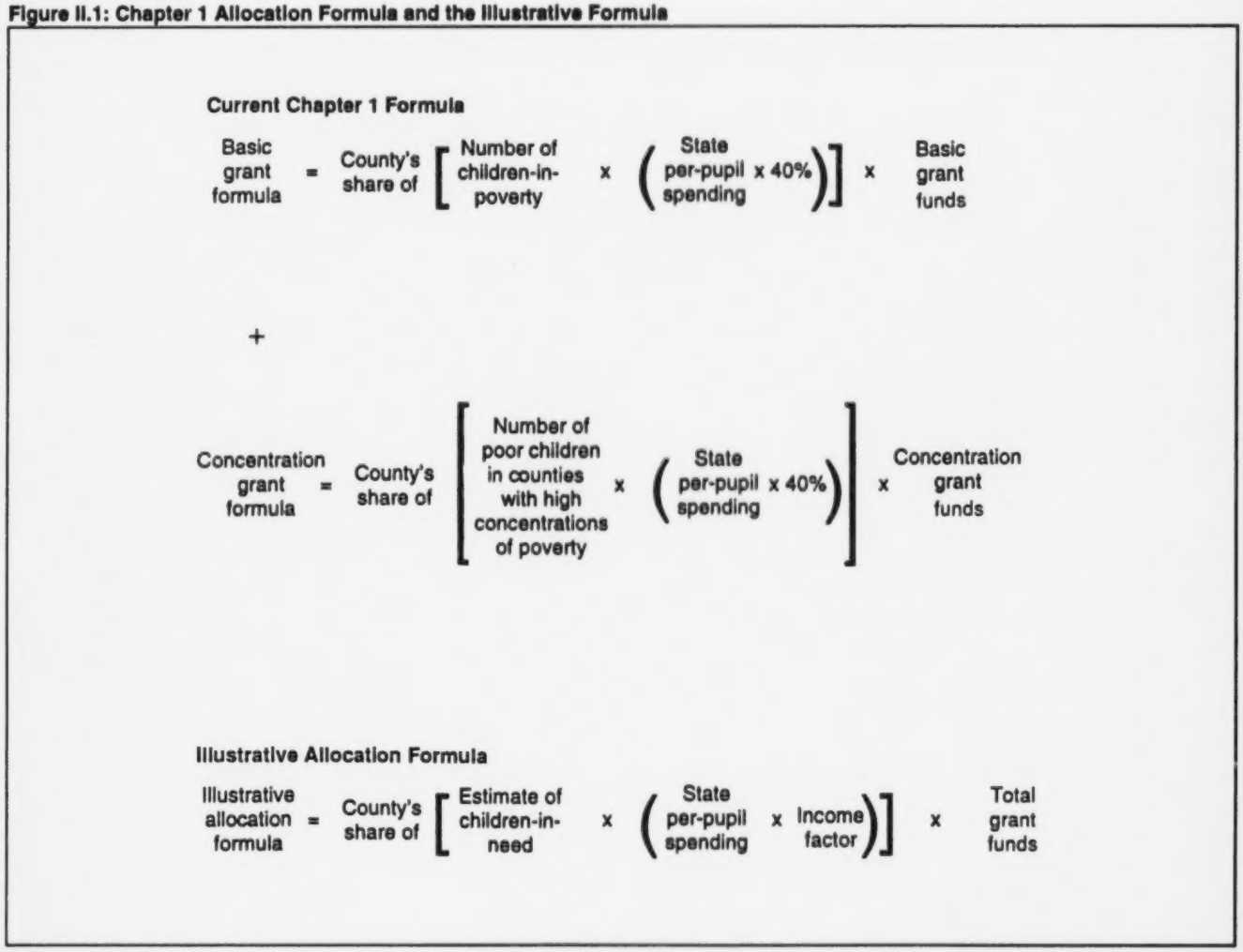
our illustrative allocation plan simulation. Otherwise, the simulation would have allocated no funds to Puerto Rico and artificially high ones to the remaining counties. Since Puerto Rico's poverty rate exceeds all state poverty rates, as a proxy, we used the average for the state with the lowest income per child-in-need.

Illustrative Funding Formula

We developed an illustrative funding formula that allocates funds through one grant process—a modified version of the basic grant. The illustrative formula (1) relied on a more precise method of estimating poverty-related low achievers and (2) used an income adjustment factor that provided additional funds to relatively low-income counties. Figure II.1 displays the current Chapter 1 funding formula and our illustrative formula.

Figure II.1: Chapter 1 Allocation Formula and the Illustrative Formula


Current Chapter 1 Formula
Basic grant formula = County's share of [Number of children-in-poverty x (State per-pupil spending x 40%)] x Basic grant funds
+
Concentration grant formula = County's share of [Number of poor children in counties with high concentrations of poverty x (State per-pupil spending x 40%)] x Concentration grant funds
Illustrative Allocation Formula
Illustrative allocation formula = County's share of [Estimate of children-in-need x (State per-pupil spending x Income factor)] x Total grant funds

Children-in-Need Measure for Schools

We constructed a multiple regression model to predict the number of low achievers at the school level. We used a second-order polynomial regression model comprised of (1) two independent variables—student enrollment and the number of poor students—and (2) one quadratic effect coefficient—the number of poor students squared.[4] Table II.1 shows the

[4]A quadratic effect coefficient—the independent variable squared—is commonly used in statistical analysis to determine if one variable; for example, numbers of low achievers, is changing at an increasing or decreasing rate with respect to another variable; for example, numbers of children in poverty.

model's regression coefficient estimates and their associated t values.[5] The number of low achievers served as the model's dependent variable.

Table II.1: Regression Equation for Predicting Numbers of Low Achievers in Schools

Independent variables	Regression coefficient	t-statistic
Intercept	-1.932	2.17[a]
Enrollment	0.107	11.27[b]
Number of impoverished children	0.307	9.40[b]
Number of impoverished children squared	0.000396	4.93[b]

Notes: Adjusted R^2=.626
N=321

[a]Significant at the .05 level.

[b]Significant at the .001 level.

Since the Chapter 1 program is designed to address the educational needs of children whose low achievement is related to poverty, our variable of interest was the number of poverty-related low achievers.[6] As such, our children-in-need estimates included both poor and nonpoor low achievers whose number increases with the number of poor children in the school. Therefore, we used the linear and quadratic effect regression coefficients for impoverished children shown in table II.1 to predict the number of children-in-need at a school. Consequently, we assumed that the number of children-in-need attending a school was equal to 30.7 percent of the number of impoverished children plus 0.0396 percent of the number of impoverished children squared.

Children-in-Need Measure for Counties

Complete school-level poverty data are available for only 1,142 (about one-third) of the nation's counties. If these data were available for all counties, we could have used the coefficients from our school-level analysis of low achievement (reported in table II.1) to impute the number of children-in-need in each school. Each county's total number of children-in-need would have been the sum of the number of

[5]The equation in table II.1 was estimated using weighted least squares where the error was assumed to be proportional to the square-root of enrollment.

[6]A simple linear regression on the relationship between numbers of children in poverty and numbers of low achievers showed that 43 percent of low achievement is associated with school poverty rate. The regression results also showed that for schools with no impoverished children, about 8 percent of their children were achieving below the 25th percentile level; indicating that not all low achievement is associated with poverty.

children-in-need for each school in that county. Because data limitations precluded this approach, we followed a two-step procedure that included regression analysis.

In step one, we used the coefficients reported in table II.1 to calculate the total number of children-in-need for the 1,142 counties in the Common Core Data Set, collected by the Department's National Center for Education Statistics for school year 1989-90, with complete school-level poverty data. In step two, we used regression analysis to estimate the relationship between the total number of children-in-need in a county (calculated from step one's data) and the total number of children in poverty in that county (from the 1980 decennial census). (As before, we included the quadratic poverty term to allow the relationship to be other than strictly proportional.) This analysis was done using the same 1,142 counties included in step one.

This second step analysis yielded coefficients that describe the statistical relationship between the number of children-in-need in a county and the number of poor children in that county. We then used these coefficients, together with data on county poverty, to impute the number of children-in-need in each of the 3,140 counties. Our results indicate that, for every county, this number is equal to 41.8 percent of the number of impoverished children in that county plus 0.000399 percent of the number of impoverished children squared. (See table II.2.)[7]

Table II.2: Regression Equation for Predicting Numbers of Low Achievers in Counties

Independent variables	Regression coefficient	t-statistic
Number of impoverished children	.418	51.5[a]
Number of impoverished children squared	0.00000399	22.4[a]

Notes: Adjusted R^2=.945
N=1142

[a]Significant at the .0001 level.

Income Adjustment Factor

We also developed an income adjustment factor to target additional funds to low-income counties. Because significant fiscal disparities exist within states as well as among states, we developed a county fiscal capacity

[7]The regression equation was estimated using the Heckman procedure to correct for sample selection bias. The inverse Mills ratio is not shown, although it was statistically significant.

factor instead of one at the state level.[8] We call this measure, which adjusts for differences in fiscal capacity, an income adjustment factor because it is based on income rather than other measures of ability to raise revenues.

Chapter 1 legislation specifies that the federal government will provide 40 percent of state average spending per pupil, but the state spending measure used cannot be less than 80 percent nor more than 120 percent of the national average. Under our income adjustment factor, an average income county would continue to receive a per-child allocation equal to 40 percent of the state average expenditure per pupil. In contrast, lower- and higher- income counties would receive more and less, respectively, than 40 percent. State school finance formulas commonly use such adjustments when the percentage of assistance is specified.[9]

Illustrated mathematically, the first part of the income adjustment formula is:

1-[.6x(county's income per children-in-need/national average income per child-in-need)]

Counties with incomes per child-in-need equal to the national average would receive [1-(.6x1)] or 40 percent of the state average per-pupil expenditure (SAPPE). Counties with incomes per child-in-need half the national average would receive a per-child allocation of 70 percent of SAPPE (or 1-[.6x.5]), which in fiscal year 1990 amounted to about 24 percent of SAPPE after funds were appropriated. Counties with incomes per child-in-need 125 percent of the national average would receive 1-(.6x1.25) or 25 percent of SAPPE, which amounted to 9 percent after funds were appropriated. For the purpose of this analysis, we set a minimum income adjustment of 20 percent of SAPPE, so that each county would get at least half of what they would have received without the adjustment.

[8]We obtained county resident income data collected by BEA, and used a 3-year average of these data (for the most recent years available—1986, 1987, and 1988) to minimize the effect of atypical years of data.

[9]Because funds appropriated in fiscal year 1990 were about 35 percent of those authorized, the federal grant per child is reduced to about 14 percent of state average per-pupil expenditures rather than the 40 percent authorized. Since the degree to which funds are reduced varies from appropriation to appropriation, we use the percentage authorized, which is 40 percent of state average spending, in our discussions.

The second part of the income adjustment formula includes a cost adjustment, which is consistent with our definition of fiscal capacity.[10] This cost adjustment used the current Chapter 1 cost factors. For those counties with costs higher than the national average, the measure of fiscal capacity, relative to the cost of its services to children-in-need, decreases. For counties with lower costs, this measure would increase. Illustrated mathematically, the entire formula for the income adjustment is:

1-{.6x[(county's income per child/national average income per child)/(state cost factor for that county/cost factor for nation)]}

Because we used a county-level income adjustment factor along with a state-level cost factor, our fiscal capacity measure may be biased. For example, if county costs are positively correlated with income, then our method understated the fiscal capacity of low-income counties. However, because of offsetting factors, such as the higher cost of hiring teachers in high-need counties, which are generally low-income counties, we believe that the net effect of any bias is small.

[10]For our purposes, fiscal capacity is defined as the potential ability of a government to raise revenues from its own sources relative to the costs of its service responsibilities. This definition can be found in: US Department of Treasury, Office of State and Local Finance, Federal-State-Local Fiscal Relations: Report to the President and the Congress, (Washington, DC: Department of the Treasury, 1985), p. xv.

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Comments From the Department of Education

UNITED STATES DEPARTMENT OF EDUCATION

OFFICE OF ELEMENTARY AND SECONDARY EDUCATION

MAY - 8 1992

Ms. Linda G. Morra, Director
Education and Employment Issues
Human Resources Division
U.S. General Accounting Office
Washington, DC 20548

Dear Ms. Morra:

The Secretary has asked that I respond to your request for our comments on the draft report, "Modifying Chapter 1 Formula Would Target More Funds to Those Most in Need," GAO/HRD-92-16, which was transmitted to the Department by letter dated March 31, 1992.

In general, we agree with you that the current Chapter 1 grants to local educational agencies formula is not a perfect mechanism for allocating funds to counties with the greatest need for compensatory education services. We are examining alternatives, including those suggested by you in the context of preparing a proposal for reauthorization of the program.

Of course a critical factor in the fair allocation of Chapter 1 monies is the use of more recent data in the formula, rather than a 12-year old census. Any suggestions for modifying the formula to incorporate more current data are worthy of full consideration.

I have enclosed the comments of staff on the draft report and specific pages with marginal notes. Thank you for the opportunity to comment. I and members of my staff are prepared to respond, should you have any questions.

Sincerely,

John T. MacDonald
Assistant Secretary

Enclosures

400 MARYLAND AVE., S.W. WASHINGTON, D.C. 20202

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Comments of Education Department Staff on GAO Report "Modifying Chapter 1 Formula Would Target More Funds to Those Most in Need," GAO/HRD-92-16.

We are concerned that the alternative mechanism you propose may have even more problems than the current formula. For example, your adjustment factors are based on assumptions about availability and accuracy of data that may not be valid. For one thing, you recommend that the formula use U.S. Department of Agriculture (USDA) school lunch data, rather than the Census decennial poverty data because, according to your report, the USDA "collects data annually at the school district level." These data are available only at the State level, so they could not really be used to make Chapter 1 allocations to counties and school districts. Further, since eligibility for free lunch is contingent on students' applying for it, an unknown but significant number of children who meet the poverty criterion are not included in the count. Use of the school lunch data could thus introduce significant biases into Chapter 1 allocations.

Now on p. 9.

A second potential problem with your proposed revision to the formula arises on page 12, where you assume that if more dollars were transferred to poor districts, they, unlike their counterparts, would expand the number of children being served rather than intensifying services to children already in the program. I know of no data to support this assumption. I am aware, however, that two major urban school districts, with high poverty rates, are currently taking steps to concentrate funds in fewer schools, even though they have received increased appropriations.

Another urban district recently decided to spend all its Chapter 1 funds in schools over 75 percent poor. In all three cases, the purpose was to intensify services. Thus, it cannot be said that a policy of targeting more funds in poverty districts would result in services to more children in these districts.

In addition, we believe that:

(1) Targeting more funds to high-poverty counties can be achieved more simply through changes to the existing basic or concentration grant formulas (e.g., by raising the poverty thresholds for concentration grants). The use of a complex series of statistical models would make the formula difficult for all but a few experts to understand, and is not necessary to achieve the goal of greater concentration of funds in high-poverty areas.

(2) GAO does not clearly explain its methodology for producing county estimates of low-achieving children. In particular, GAO's use of school-level data to produce county-level estimates of low-achievers is confusing and raises concerns about aggregation. Also, sources for the school and county-level poverty data used in producing the estimates are not specified.

(3) The use of GAO's statistical models could open the Federal Government to complaints of statistical manipulation, because the distribution of funds would be dependent upon the specific variables and functional form selected for the models.

Finally, a major caveat to your analysis of whether Chapter 1 funds are reaching the districts with "children-in-need" must be that your estimates of the number of such children are based on data that are now 17 years old. More recent data might well yield very different results.

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